SOLICITATION FOR FINANCIAL ASSISTANCE APPLICATIONS NO. DE-PS26-03NT41714-00

SUPPORT OF ADVANCED FOSSIL RESOURCE UTILIZATION RESEARCH BY HISTORICALLY BLACK COLLEGES AND UNIVERSITIES AND OTHER MINORITY INSTITUTIONS

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Web site at: *http://e-center.doe.gov*

SECTION I - TECHNICAL REQUIREMENTS

1.1 SUMMARY (MAR 2001)

The Department of Energy (DOE), National Energy Technology Laboratory (NETL) is seeking applications for the Financial Assistance Solicitation No. DE-PS26-03NT41714 entitled "Support of Advanced Fossil Resource Utilization Research by Historically Black Colleges and Universities and other Minority Institutions."

1.2 BACKGROUND INFORMATION (JAN 2000)

The intent of the Fossil Energy HBCU/OMI Program is to establish a mechanism for cooperative HBCU/OMI research and development projects; to provide faculty and student support at the institutions; to foster private sector participation and interaction with HBCU/OMIs in fossil energy research and development; to provide for the exchange of technical information and research hardware; to raise the overall level of competitiveness by the HBCU/OMIs with other institutions in the field of fossil research; and to tap a heretofore under-utilized resource by increasing the number of opportunities in the areas of science, engineering and technical management for HBCU/OMIs. The collaborative involvement of professors and students from the HBCU/OMI and the commercial sector in the development and execution of fresh new research ideas, and the establishment of linkages between the HBCU/OMI and private sector fossil energy community are essential to the success of this program and equally consistent with the goal of ensuring the U.S. a future supply of technically competent managers, scientists, engineers and technicians from a previously under-utilized resource. It will also serve to maintain and upgrade the educational, training, and research capabilities of our HBCUs/OMIs in the fields of science, engineering and technical management, and provide the talent for an improved utilization of the nation's fossil fuel resources. Therefore, the DOE's National Energy Technology Laboratory (NETL) invites HBCUs/OMIs, in collaboration with the private sector, to submit applications for innovative research and development of advanced concepts related to fossil energy resource utilization. HBCU/OMI faculty members and their institutions, in collaboration with the private sector, are strongly encouraged to undertake fossil energy-related research and development or to continue ongoing work in this area.

1.3 SOLICITATION OBJECTIVES (MAR 2001)

Grants awarded under this Program Solicitation are intended to maintain and upgrade educational, training and research capabilities of our HBCUs/OMIs in the fields of science and technology related to fossil energy resources.

1.4 TECHNICAL TOPICS

Several fundamental changes are underway in the energy industry. Widespread deregulation is changing the nature of the industry. While eventual effects are uncertain, the industry will clearly be far more diverse and complex. These trends lead to a vision of a future economy where electric, clean liquid fuels, energy, and manufacturing are closely intertwined in a highly efficient,

flexible economic system. This evolution provides the foundation for both our Vision 21 and Clean Liquid Fuels Programs.

Vision 21

The concept of Vision 21 encompasses a fleet of advanced, highly efficient, non-polluting energy plants that will compete effectively in the future energy market. Vision 21 plants are a set of flexible, modular systems that can be integrated and tailored to market demands for high-value, fossil-based commodities, such as clean fuels (chemicals and feedstocks), and/or electricity. Among the unique capabilities of Vision 21 will be its ability to provide these energy products while achieving net zero CO_2 emissions, thereby virtually closing the carbon cycle for fossil energy.

The integrated program path leading to Vision 21 builds on technology being developed and demonstrated today. A key component is the Clean Coal Technology Demonstration Program, which establishes the foundation on which the next generation of technologies will be developed and advanced. Vision 21 will require enhanced versions of the technologies in the existing Coal and Power Systems portfolio as well as some new areas to be developed within these technologies, such as gasifiers, hot gas cleanup systems, fluidized-bed combustion, fuel cells, advanced turbines, hybrid cycles, high-temperature heat exchangers, oxygen separators, hydrogen separators, fuels, and conversion processes. Fossil Energy Product Lines will be strategically aligned to assist the nation to effectively use and manage natural carbon resources and to achieve the goals of Vision 21.

Clean Liquid Fuels

The historic and projected sources of petroleum for our Nation are well known, as are the end-uses of refinery products. Though 2/3 of petroleum is used in the transportation sector, other end uses (e.g. residential home heating oil) are also of importance.

The ever-increasing quantity (and percentage) of petroleum imports, most from less secure regions of the World, pose major risks to our National Security and economic well being. Today imports of crude oil and refined products make up over 55% of our total petroleum use. This is significantly higher than during the energy crises of the 1970s. Without alternatives, DOE projects that these imports will exceed 64% of our petroleum needs by 2020. Also, 40% of our imports are heavy and sour crudes from Canada, Mexico and Venezuela. These heavier imports, which require more hydrogen and additional processing to convert to refined products, when combined with the continued decline in the production and quality of our Nation's crude, place an increased strain on our domestic refinery industry.

In addition, the American public continues to demand superior environmental performance in the

production, processing, and utilization of liquid fuels. This is of particular concern as related to the transportation sector that accounts for 25% of our total energy use. The transportation sector is a major source of CO, NOX, and Volatile Organic Compound (VOC) emissions. Petroleum use also contributes 43% of the Nation's carbon dioxide emissions, making it the largest U.S. source.

The initial focus of this program is on the National security and environmental performance issues within the context of our existing liquid fuels infrastructure, with particular emphasis on the National transportation system (Ultra-Clean Transportation Fuels). R&D efforts with a longer-termed view (Future Fuels) envision a substantially changed liquid (and gaseous) fuels infrastructure.

The Clean Liquid Fuels program seeks to:

- make the U.S. less vulnerable to international energy crises and liquid fuel shortages,
- improve the environmental performance of every component in the liquid fuels production, processing, delivery and utilization chain, and
- make possible a significantly cleaner and more efficient transportation fleet.

This Clean Liquid Fuels program is targeted at the produce clean liquid fuels (e.g. gasoline, diesel, and home heating oil) that:

- are derived from a diverse mix of secure energy resources, including domestic petroleum, natural gas, coal, and waste materials;
- enable mobile (ground, air, and marine) and stationary systems to comply with increasingly stringent Federal, state, and local environmental standards;
- are compatible with the existing liquid fuels infrastructure;
- satisfy commercial and military requirements;
- enable the efficiency of our current transportation fleet to be more than doubled while achieving stringent environmental standards; are developed in partnership with end-use industries, including engine manufacturers, and
- are cost competitive with conventional and other alternative fuels.

Product Lines that are currently managed by Fossil Energy include the following: In the Office of Product Management for Fuels & Specialty Markets- Natural Gas Supply and Storage, Natural

Gas Processing, Transportation Fuels & Chemicals, Fuels Systems Advanced Research, New Business Development, and International Programs; in the Office of Power Systems Product Management- Pulverized Coal Combustion, Environmental, Power Systems Advanced Research/AR&TD, Integrated Gasification Combined Cycle (IGCC), Fluidized Bed Combustion, Advanced Turbine Systems, and Fuel Cells; and in the Office of Product Management for Environmental Management (no topics in this solicitation)- Industry Programs, Decontamination and Decommissioning, Technology Applications, Nuclear & Strategic Processes, and the Center for Acquisition and Business Excellence.

In order to develop and sustain a national program of university research in advanced technologies and fundamental fossil fuels studies, the Department of Energy Office of Fossil Energy is interested in providing assistance to develop and maintain a broadly-based research infrastructure to provide educational and research training opportunities for tomorrow's scientists. Grant applications are sought in innovative research and development of advanced concepts pertinent to fossil fuel conversion and utilization in the eight (8) technical topics specified below. Technical Topics 1 through 7 are considered to be in the HBCU/OMI Core Program; education and research training must be a strong component and private sector collaboration is strongly encouraged. Technical Topic No. 8 is considered to be in the Faculty/Student Exploratory Research Training Grant Program.

While all Technical Topics are of importance to Fossil Energy programs and product lines, areas which are emerging as higher priority include the following: problems related to Global Climate Change and Greenhouse gases (especially carbon dioxide), Materials (as related to advanced power system components and advanced separations), Catalysis (for improved reaction chemistry, higher efficiencies, short residence times, etc.), Computer Modeling (especially related to Vision 21 scenarios for fossil energy, and advanced Coal Characterization (related to fossil and biomass carbon as a feedstock, solid fuels, and coprocessing), control and characterization of Mercury and fine particulate ($PM_{2.5}$), and Computer Enhancements and Reservoir Modeling as related to oil and gas recovery), Continued Emphasis on flooding issues and geoscience as related to improved oil and gas recovery technologies, and Optimization for Oil Well Completions and Stimulations.

In response to recent changes in our energy industry and the realignment of Fossil Energy, these Technical Topics have undergone revision from previous solicitations. Please carefully review these Topics before preparing your proposal. The ordering of these Topics is unrelated to any implied relative order of importance.

TECHNICAL TOPIC 1 - Advanced Environmental Control Technologies for Coal

There are numerous problems related to the use of coal in energy utilization and conversion systems. Coal is a solid fuel and contains components that are precursors of environmental pollutants or materials that are potentially damaging to downstream components. These deleterious materials include nitrogen and sulfur which form undesirable oxides during combustion, as well as hazardous trace elements. Furthermore, coal contains mineral matter

which is converted into ash during combustion that can lead to suspended particulates in air, deposition or erosion of downstream system components, and problems related to air toxics and solid waste disposal. The objectives of this topic are to mitigate the environmental disadvantages of coal utilization through improvements in various aspects of the fuel cycle, from coal extraction and preparation through combustion-related waste utilization or disposal.

SPECIFIC EXAMPLES (including but not limited to):

- Improved approaches to coal mining technologies to reduce environmental impacts.

- Advances in the following processes for preparation of coal and biomass-based solid fuels and feedstocks: surface or density-based cleaning, especially advanced dewatering/drying, reconstitution/ handleability, and enhanced energy recovery through applications of high-technology instrumentation.

- Optimization programs for preparation of coal and biomass-based solid fuels and feedstocks, including software (i.e., advanced diagnostics and algorithms) that supports artificial intelligence and neural networks in the whole plant or in unit operations within the plant to improve plant process efficiency and product quality.

- The development of technologies for the recovery and processing, into a singular fuel form (e.g., pellets, briquettes, slurry, etc.), of coal fines that are currently impounded or are now being generated as waste products from coal preparation plants.

- Identification of novel approaches (suitable for utility use) to recovering waste coal fines and processing of cleaned coal fines to be combined with other waste materials (e.g., sludge, fibers, biomass, etc.) to provide a uniform, marketable product.

- Developmental studies for producing smokeless solid fuels based on coal for residential use; large international markets exist in Africa, China, India, Korea, etc., for economical and environmentally benign coal-based solid fuels with no significant health effects).

- Development of acceptable industrial monitoring devices or other methods that will allow quantitative detection, at very low concentration, of mercury, trace metals, volatile organic compounds and aerosols for individual samples, continuous emissions monitoring, or remote sensing [especially to determine (measurement and predictive capability) the form/species and fate of mercury (vapor vs particulate-bound) and other significant trace metals from coal utilization].

- Research on the capture of pollutants both internal and external to the combustor, with or without sorbents, and on the regeneration of the spent sorbents.

- Development of techniques for generating salable by-products from waste streams and flue gases in coal utilization processes. Innovative and cost-effective methods for directly

converting H_2S and SO_2 to sulfur or other marketable sulfur-based products.

- Novel methods for reducing NO_x such as catalytic reduction with less costly and more environmentally benign reductants, direct catalytic decomposition without the use of reductants, or more efficient non-catalytic reduction.

- Development of technology for minimizing NO_x formation in cyclone-fired boilers or wet-bottom slagging combustors, which would reduce overall plant cost for NO_x emissions control and for waste disposal.

- Estimation of the effect that coal characteristics will have on NO_x emissions resulting from coal combustion using advanced models for rapid coal devolatization.

- Study of novel methods of CO_2 collection in a relatively pure form, from both conventional and advanced coal-based power systems.

- Research regarding the development of CO_2 disposal methods that are technically, economically, and ecologically feasible. Research (mostly analytical with small scale experiments) is desired that deals with the fate of carbon dioxide in the deep ocean, in abandoned and depleted oil and gas reservoirs, unmineable coal seams, and in deep confined aquifers.

- Study of formation, mitigation and elimination (prevention) of pollutants, and particulates emitted to the atmosphere associated with coal utilization; novel flue gas cleanup and hot gas clean up techniques for high efficiency removal of particulates (especially $PM_{2.5}$), sulfur and nitrogen compounds (with respect to fine particulates), mercury and halogens, including high temperature membrane separation for trace contaminant removal, and advanced air separation technologies.

- Research on high-temperature effects of sintering, fluidity, coalescence and reactions of coal mineral matter as it relates to techniques for determining high temperature filterability of coal ash from gasification and combustion processes and how the ash filterability relates to its other physical properties.

- Advanced separation techniques for processing waste streams from coal utilization processes (combustion and gasification), such as fly ash,CFBC ash and slag and converting them to useful products (e.g., removing carbon from fly ash and slag). Innovative methods for producing higher value-added products that use ash and slag as the basic raw ingredient (e.g., ceramic tile production). Demonstrated marketable uses for fly ash containing unburned carbon such as that produced with some low-NOx burners or from gasifiers.

TECHNICAL TOPIC 2 - Advanced Coal Utilization

Coal is abundant and inexpensive compared to oil and gas. The efficient use of coal is

constrained by the difficulties of using a solid raw material for producing fuel, chemicals and other feedstocks and of managing the by-products of coal utilization (e.g. solid fuel combustion by-products include particulate, ash, and gaseous wastes). The results of innovative research could contribute to coal utilization by enabling users to handle coal with higher levels of confidence approaching that of liquid and gaseous fuels. This topic explores advanced combustion techniques, as well as other systems and materials, that allow coal to be utilized more efficiently and more cleanly than in currently deployed conventional systems.

SPECIFIC EXAMPLES (including but not limited to):

- Research on coal as a feedstock for production of chemicals.

- Research on advanced fuel cell concepts, including analysis of advanced systems, CO_2 separations, electrocatalysts, reactants, purification and gas separation, improved materials (e.g., electrodes, gas seals, sealing materials, interconnects, separator plates, and coatings); and study of the effects of contaminants on the performance of fuel cells. Investigations of innovative methods for cost-effective in-situ removal of deposits including ash, carbon, and trace metals from high-temperature molten carbonate and solid oxide fuel cell surfaces are needed for long-term operation (40,000 hours).

- Development of Innovative Protective Surface Oxide Coatings to permit exploitation of the potential of advanced high-temperature materials designed to significantly improve energy efficiency and reduce deleterious environmental impact (e.g., to achieve the performance goals of the Vision 21 power plants). There is a need to expand the scientific and technological approaches to improving stable surface oxides for corrosion protection in high-temperature oxidizing environments.

- Investigations of new cycles for power generation to increase the efficiency of power plants to well over 45%; studies may include high temperature (~1,000F), high pressure (~2,400 psi), ammonia/water vapor/liquid thermodynamic properties at various volume ratios, validation of efficiency projects, alternative approaches to complex combined cycle evaluations for better matching of conventional and advanced technology processes, economics, and identification of barriers to commercialization (corrosion and new materials investigations, heat transfer coefficients in two liquid mixtures for application in falling film heat exchangers). Novel topping and bottoming cycles may also be offered.

- Development of techniques and instrumentation for in-situ, on-line analysis and control systems for solids flow, high-temperature gasification, temperature measurements, etc. for systems using coal and coal-derived products.
- Characterization and/or demonstration of the carbon in coal as a potential feedstock for advanced clean fuels, chemicals, advanced materials, and other marketable products

- Study of the structure, reactivity, and other chemical and physical properties of activated carbons and carbon molecular sieves derived from coals of various rank, or coal tar pitch

and its carbon-based products. Similar characterizations are needed for carbon in fly ash and bulk ash and interactions with flue gas- derived mercury.

- Technology development aimed at the production of new and improved premium carbon structures (e.g., high-strength fibers) for utilization in various industries such as automotive, aerospace, etc.

- Study of the formation and vaporization of alkalies, and determination of their state at specific gasifier and combustor conditions of temperature and pressure; techniques for removing alkalies and chlorine from coal gas or waste streams at high temperature.

- Research on advanced combustion control diagnostics that provide continuous on-line measurement and control of the fuel and air flow rates for each burner, or at specific locations in the boiler or coal combustor.

- Developmental studies for advanced materials, both alloys and ceramics, and components for both directly and indirectly fired coal-based power systems that can withstand the high-temperatures and corrosive environments encountered in coal combustion systems.

- Novel concepts for developing hybrid systems that use both coal/coal-derived fuels and renewable energy sources. Development of technologies for co-feeding coal and other low-cost carbon-based feedstocks (e.g. biomass, municipal waste) to high pressure gasifiers (both dry and slurry-feed systems).

TECHNICAL TOPIC 3 - Clean Fuels Technology

DOE is soliciting proposals for research related to the production of premium fuels and products from coal. These fuels and products, and the precursors required for their production, include diesel, jet fuel, and carbons such as pitches or cokes. In addition, technologies related to the economical production and separation of hydrogen will be required to facilitate the use of coal for many of these fuels and products. The fuels of the 21st century will have to satisfy the competing demands of environmental acceptance and engine performance. In order to be embraced by the marketplace, engines must deliver the required acceleration, horsepower, reliability, and conformance to specifications. At the same time, cleaner burning fuels will be required to minimize both airborne pollutants and emission of carbon dioxide. Increased emphasis on the control of particulate matter is likely in light of the growing popularity and practicality of diesel engines. A similar set of concerns exists for jet fuels. One type of fuel currently under development and capable of providing such qualities is a next-generation diesel fuel produced via a Fischer-Tropsch (F-T) process. Novel concepts furthering this and/or other approaches to the development of premium fuels and products are sought.

SPECIFIC EXAMPLES (including but not limited to):

- Advanced diagnostics and modeling techniques for three-phase slurry reactors (bubble

columns) will be valuable for their design, scale-up, and efficient operation in the conversion of synthesis gas into liquid fuels by the Fischer-Tropsch process. To develop such a model, both the hydrodynamic parameters and the complex chemistry of the F-T reaction must be fully understood and well integrated. Proposals are sought for investigations of advanced diagnostic techniques for the measurement of hydrodynamic parameters under F-T reaction conditions and for models incorporating the hydrodynamic parameters and reaction kinetics for the three-phase slurry reactor.

- Development of novel catalysts is required for the conversion of synthesis gas into clean-burning diesel fuels or jet fuels. These advanced fuels, particularly those required by the next generation of diesel engines, are characterized by high cetane numbers, low sulfur content, and low (or zero) aromatic content. These fuels or fuel additives may include conventional F-T diesel fuels or oxygenated (ether, acetal) fuels. These novel catalysts should offer significant advantages such as higher selectivity to the diesel boiling range, higher activity under milder operating conditions, or other characteristics that lead to improved economic competitiveness.

- Dimethyl ether is one candidate for a clean burning oxygenated diesel fuel of the future. However, its entry into the market place has been hindered by its low boiling point. An improved fuel would retain is desirable combustion characteristics and possess a suitably low volatility. Development of improved processes to convert dimethyl ether or other low boiling oxygenates into higher molecular weight oxygenated fuels is needed. The process would ideally result in a liquid, oxygenated fuel that could be easily integrated into the current fuel distribution infrastructure.

- Precursors of high value carbon products might be obtained from coal through milder versions of direct liquefaction processes originally designed to produce only fuels. Processes that lead to high value carbons and by-product fuels could become economically competitive before fuels only-plants. Process concepts are of interest that are based on innovative routes to materials (pitches, cokes) that lead to high-value carbons. Such processes could use coal or co-processing schemes for coal plus other heavy liquids, petroleum residues, etc.

- Production of clean fuels from coal ultimately requires significant quantities of hydrogen. Hydrogen production often entails the emission of CO_2. To bring about the production of clean fuels at least cost and lowest emissions of CO_2, novel ideas are needed for the generation of hydrogen from coal by means that allow CO_2 to be captured in an efficient way for subsequent sequestration. Fundamental studies are sought that would lead to improved technologies for integrated hydrogen production/CO_2 capture processes.

TECHNICAL TOPIC 4 - Heavy Oil Upgrading and Processing

The availability of quality transportation fuels at reasonable costs is vital to the economy and the defense of the United States. Environmental concerns are forcing the demand for cleaner

burning fuels which mean fuels with lower boiling ranges, less sulfur, lower aromatics, and additives to reduce emissions. To reduce the aromatics and sulfur in the heavy fractions, hydrogen must be added since the alternative, i.e., acquiring the hydrogen from molecules by rejecting carbon, consumes far more resource per unit of quality transportation fuel produced while yielding a mass of low-value, high-carbon product. This work will apply to other heavy resources such as shale oil, coal liquids, and tar sands oil when their time comes.

SPECIFIC EXAMPLES (including but not limited to):

- Improved understanding of the chemistry of adding hydrogen to heavy feedstocks.

- Improved understanding of the chemistry of the removal of contaminants, i.e., S, N, O, metals, etc., from heavy feedstocks.

- Development of new and less expensive means for producing hydrogen from feedstocks other than light hydrocarbons, such as natural gas, that are excellent as is.

- Development of new and less expensive contaminant removal processes for heavy oils along with environmentally acceptable means of disposing of the contaminants when removed.

- Development of new knowledge to be used to improve catalytic cracking and hydro cracking catalysts and processes.

- Development of the knowledge, catalysts and processes necessary to reduce the production of petroleum coke.

TECHNICAL TOPIC 5 - Advanced Recovery, Completion/Stimulation, and Geoscience Technologies for Oil

DOE seeks innovative methods and concepts that will contribute to more efficient, effective, and economical techniques for the recovery of domestic oil in declining fields. After primary (natural forces) and secondary (water flood and gas) pressurization recovery techniques have been used, approximately 2/3 of the original oil remains in place in the known producing fields, an estimated 327 billion barrels. About 100 billion barrels of this potential resource exist as pockets of mobile oil, bypassed because of heterogeneities in the reservoir. Much of this remaining oil can be produced by conventional methods once its location and the cause of its non-recovery are determined.

Residual oil is also susceptible to recovery by enhanced oil recovery (EOR) techniques (i.e., the injection of heat, gases, or chemicals). Better reservoir understanding and engineering design of all of these operations (primary, secondary, and EOR) is needed to increase domestic oil production. Reservoir characterization is the most important means of understanding the reservoir. Its two main facets - defining the anatomy of the reservoir and determining how that anatomy governs fluid movement - are requisite to any improvements in oil recovery strategy.

GENERAL DESCRIPTION OF RESEARCH INTEREST (Innovative grant applications are sought to improve the recovery of oil. Research in the following areas is limited to):

- Novel Low-cost Surfactants for Oil Recovery- If effective low cost surfactants can be found, the potential for surfactant flooding is great. The main reasons most surfactant floods are uneconomical are because of the high cost of the surfactant and high adsorption. The proposed surfactants need to tolerate a wide range of temperatures and brines of varying salinity and hardness. The proposed surfactants need to be available in sufficient quantities to be well characterized; therefore, surfactants produced in-situ or by in-situ microbes will not be acceptable. The novel surfactants proposed should neither be currently available from any major chemical supplier nor under patent rights to anyone other than the applicant.

- Novel Low-cost Methods for Sweep Improvement in Carbon Dioxide Flooding- Carbon Dioxide flooding is currently producing over 150,000 barrels per day in the United States. This production could be greatly increased if the injected carbon dioxide could be made to better sweep the reservoir. Several methods have been employed to economically improve the sweep efficiency of the injected carbon dioxide. Methods such as foams, entrainers (chemicals that increase the viscosity of the carbon dioxide), and water-alternate-gas (WAG) have been applied. The novel low-cost methods proposed may be based on these methods; however, the proposed methods must show promise of significant improvement.

- Recovery of Heavy Oil- Two major problem areas in steam injection processes are excessive wellbore heat losses and low reservoir sweep efficiency. Grant applications are sought on novel techniques to: (1) reduce wellbore heat losses using an effective, inexpensive insulating fluid in the tubing-casing annulus; and (2) improve the effective sweep of the reservoir by a) reducing the effect of overriding gravity segregation; b) improving mobility control; and c) better definition of reservoir heterogeneities. Research in wellbore heat losses should not include insulated tubing or solid materials in the tubing-casing annulus. Multiple injectants, either injected from the surface or created in-situ, may be considered for mobility control.

- Optimization of Oil Well Completions and Stimulations-
  A complete understanding of the effects of specific types of completion technology is desirable with an effort to improve/ control the processes and accurately monitor the results. Determination of the impacts of various completion or stimulation technology employed downhole in actual field as well as laboratory tests is necessary to improve these processes. The creation of low cost, user friendly software, tailored for local or individualized well locations and having specific operator input, would be extremely beneficial in completion or stimulation decision-making.

  New well completion and stimulation technology, utilizing formation sand control and/or

consolidation techniques, advanced acidization or well bore treatments, microbial processes, formation fracturing, and real time seismic data acquisition in conjunction with these treatments as a monitoring tool are additional areas of anticipated new technology growth.

- Oil-Field Geoscience- A more complete understanding of the internal architecture of reservoirs, with an emphasis on the location and prediction of pore-scale to interwell-scale heterogeneities, is the key to determining how that anatomy governs reservoir fluid movement.

  Grant applications are sought on novel methods of characterization to quantify reservoir parameters including porosity, permeability, pore structure, capillary pressure, fracture patterns, and facies geometry. Techniques are also sought to interpret dispositional, diagenetic, or structural features of reservoirs for prediction of the spatial distribution of heterogeneities and their influence on fluid flow within known oil reservoirs.

  Novel improvements are sought in instrumentation for use in characterization of known hydrocarbon reservoirs such as wellbore logging, seismic tomography, electromagnetic tomography, three-dimensional seismic profiling, and innovative techniques for computer modeling of reservoir heterogeneities and reservoir/fluid interactions.

TECHNICAL TOPIC 6 - Natural Gas Supply, Storage, and Processing

DOE seeks innovative methods and concepts that will allow more efficient, economical, and environmentally acceptable recovery of natural gas. Novel improvements in recovery techniques could lead to lower production costs and/or greater recovery efficiencies. The DOE's interest in drilling, completion, and stimulation is to lower capital investment, improve recovery, and minimize formation damage. Collectively, these objectives are expected to reduce the unit cost of accessing and producing natural gas. The technology focus for low-permeability formations emphasizes improvements in the detection, mapping and analysis of naturally fractured gas reservoirs so that economical recovery methods may be realized. Program activity in gas delivery and storage is focused on assisting the storage industry in the development of new or existing storage system capacity and deliverability. Research in natural gas upgrading emphasizes converting methane to liquids or chemicals in a simple one- or two-step process under moderate operating conditions of pressure and temperature, and advancing processing technologies for raising low-quality raw natural gas to pipeline quality. Finally, environmental aspects of producing gas wells emphasize methods to reduce the costs of achieving environmental compliance in the various production regions within the states.

SPECIFIC EXAMPLES (including but not limited to):

- Innovative methods for technologies, systems, and methods which increase rate-of-penetration, provide real time information on drilling, develop new tools for cutting medium-to-hard formations, enhance horizontal well drilling, minimize stimulation concepts, and/or

develop new or improved completion hardware.

- Development of high resolution seismic techniques for locating subsurface fracture systems in low permeability formations and for mapping and analyzing the extent of the fractured reservoir so that the orientation of horizontal or inclined boreholes can be designed for optimal recovery.

- Cost effective methods to revitalize deliverability from existing natural gas storage wells and for locating new wells to control gas migration in the reservoir and/or for optimizing storage field development.

- Innovative techniques for upgrading natural gas to liquid fuels and for raising low-quality raw natural gas to pipeline quality.

- Technology for the measurement, treatment, minimization and disposal of naturally occurring radioactive materials in drilling and production operations.

- Development of guidelines for gas drilling operators to lower the costs for environmental compliance in various locations.

- Methodologies for controlling methane emissions from gas producing sources to achieve environmental compliance.

TECHNICAL TOPIC 7 - Fuel Cells

Fuel Cell technology development seeks to dramatically reduce the cost of solid-oxide fuel cell stacks or increase the efficiency of fuel cell systems. New advances offer to potentially lower fuel system costs, shorten development time, take advantage of economy of scale and mass customization, expand the fuel cell market, exploit the synergy between fuel cells and turbines, and simplify the fuel cell balance of plant (BOP).

Fuel cell concepts capable of approaching $100/kilowatt stack costs and fuel cell system efficiencies approaching 70-80% are desired to meet the Vision 21 goals. The Solid State Energy Conversion Alliance (SECA) Program goals will require a fuel cell system that can be manufactured for $400/kilowatt by 2010. The Fuel Cell program has focused on fuel cell stacks, cell systems, and fuel cell hybrid system concepts. Some of the barrier issues in order to reach these goals include:

- Advanced fuel cell materials and manufacturing processes
- Improved fuel cell designs
- Improved modeling methods
- Advanced low-cost BOP components
- Technology for advanced system operation and life-cycle cost reduction

The DOE encourages proposals that address these barrier issues for solid-oxide fuel cells.

TECHNICAL TOPIC 8 - Faculty/Student Exploratory Research Training Grants

Over the long term, all parties will benefit (HBCU/OMI and DOE) if the overall HBCU-OMI research infrastructure can be developed and maintained. If expanded beyond the typical research institution, science and engineering interests can be encouraged at an earlier stage of educational development, improved research training can lead to better prepared graduate students entering the major universities, primarily teaching faculty can continue to pursue limited research interests, and a highly-qualified pool of potential employees may be developed for the fossil fuels industry. "The Faculty/Student Exploratory Research Training Grant" is envisioned as an opportunity to maximize the participation of students and faculty among all of the qualifying institutions.

These grants for research/ research training to be conducted over a one-year period have a maximum value of $20,000. The proposed work can take the form of a novel idea or concept to be tested at a preliminary stage, or the work can address a small unique aspect of a larger problem, or the work can continue or expand on previous work (e.g. sorbent formulations, catalyst conditions, etc.), or some other concept; but, the topic must fall within fossil energy research needs (Technical Topics 1-7). Note from the evaluation criteria, that there is a much greater burden (compared to the Core Grant) for the proposer to demonstrate enhancements to the research infrastructure that will accrue to the institution if they receive the award.

Since grants to be awarded under this topic are small and of short duration, the technical applications are easier to prepare (15 pages) and they are evaluated against fewer criteria compared to applications submitted under the Core Program. The expected outcome is that many of the smaller institutions, to include Master's Degree granting institutions and undergraduate degree granting institutions (primarily teaching institutions), will find this opportunity to be more palatable/ compatible with the goals of their science and engineering Departments and professional faculty.

This is the only topic [Topic eight (8)] under this Program Solicitation that does not have private sector collaboration as a goal in consideration of an application.

SECTION II -CONDITIONS AND NOTICES

2.1 APPLICANT ELIGIBILITY (MAY 2001)

Pursuant to 10 CFR 600.6(b), eligibility for participation in this Program Solicitation is restricted to HBCUs/OMIs recognized by the OCR, U.S. Department of Education, and identified on the OCR's Department of Education U.S. Accredited Postsecondary Minority Institutions list in effect on the closing date of the program solicitation. Pursuant to 10 CFR 600.6(b), eligibility for award under the subject solicitation is restricted to HBCUs/OMIs. Statutory authority for this Program is provided by Public Law 95-224, as amended by 97-258. The website address for the OCR list is

http://www.ed.gov/offices/OCR/minorityinst.html. Applications submitted by any institution not on OCR's aforementioned list are ineligible for technical evaluation and award. For information regarding the qualification criteria and process of becoming recognized by the Education Department's OCR as a "Minority Institution", institutions should contact the Education Department directly at the following address: Mr. Peter A. McCabe, Office for Civil Rights, U.S. Department of Education, Washington, DC 20202, Telephone (202) 205-9567. Note: The Education Department should only be contacted on matters related to Institutional status;
questions regarding the Program Solicitation should be directed to Ms. Delmastro at DOE.

2.2 NUMBER AND TYPE OF AWARDS (JAN 2000)

It is anticipated that there will be approximately four to eight awards, with an expected value of $200,000 each for topic areas 1-7 and an expected value of $20,000 for topic area 8. The total expected project value will be $1.0 - $1.5 million (DOE share). However, the Government reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this solicitation and will award that number of financial assistance instruments which serves the public purpose and is in the best interest of the Government. The Government intends to use Financial Assistance Grants as the type of award instrument(s).

2.3 LIMITATIONS ON FUNDING AND PROJECT PERIODS

DOE reserves the right to support or not to support, in whole or in part, any or all applications received, and to determine the number of awards to be made through the solicitation subject to funds available in this fiscal year.

The maximum DOE funding for each financial assistance award under this Program Solicitation is as follows:

	Maximum DOE Funding
Topics (1) - (7)	$200,000
Topic (8)	$20,000

Grants will be awarded to the successful HBCU/OMI for a time period of up to thirty-six months for the HBCU/OMI Core Program--i.e., Technical Topics 1 through 7--and up to twelve months for the Faculty/Student Exploratory Research Training Grant Program--i.e., Technical Topic No. 8.

2.4 ELIGIBILITY REQUIREMENTS

1. Applications must be submitted through IIPS by a qualified HBCU/OMI authorized representative. Offerors must be an HBCU/OMI as defined above. Applications from HBCU/OMI-affiliated research institutes must be submitted through the college or university with which they are affiliated. The university (not the university-affiliated research institute) will be the recipient of any resultant DOE grant award. (See Section 2.1)

2. The Principal Investigator or Co-Principal Investigator listed on the application must be a teaching professor at the submitting HBCU/OMI and a minimum of 30% of personnel time invoiced under the grant is to pay for student assistance for each year of the grant.

3. If Private Sector Collaboration is proposed, the following additional eligibility requirements are imposed:

Qualifications are

(a) Any private sector business will qualify as a "private" collaborator; however, the following are specifically excluded from recognition as private sector collaborators --Federal, State or local government agencies (because they are considered to be in the "Public Sector"), Federally Funded Research and Development Centers, and colleges or universities or their affiliated research institutions.

(b) Each applicant must clearly delineate the relationship of the HBCU/OMI and the private sector entity -- the HBCU/OMI must be identified as the "prime recipient" in the application. The private sector entity is ineligible
to propose on its own behalf.

(c) Private sector collaboration of any of the following types, or any combination thereof, will be considered appropriate for this solicitation:

(i) *Cash cost sharing* received by the HBCU/OMI awardee from private sector participant(s).

(ii) *No-cost collaboration* over some defined frequency of occurrences with the private sector participant(s) that agree(s) to consult with the Principal Investigator and to share information which will assist in improving the experimental plan and/or assist in analyzing data obtained by the Principal Investigator. *Free use of industrial*
experimental facilities and instrumentation not available at the university is included in this category of Subcontracting to any entity (private, public, university) is limited to 25% of the DOE share of the project.

(iii) *Subcontracting* by the HBCU/OMI awardee to the private sector participant(s) is limited to 25% of the DOE share of the project cost.

(iv) *Participation* by any Government agency (Including DOE M&O Contractors) is limited to 25% of the DOE share of the project cost. (See Section 2.17 for additional instructions about M&O Participation.)

2.5 AVAILABILITY OF FUNDS (AUG 1999)

It is estimated that approximately $1.0 million – $1.5 million will be available for award under this solicitation, subject to the availability of funds.

2.6 PROJECT PERIOD (AUG 2000)

The Government anticipates the project period for the subject awards to range from 12 to 36 months in duration but not to exceed 36 months (12 months for Topic 8.) Awards will have project and budget periods that are specific to the project and funding.

2.7 TIME, DATE AND PLACE APPLICATIONS ARE DUE – IIPS (FEB 2002)

All applications shall be submitted in an electronic format through DOE's Industry Interactive Procurement System (IIPS) in accordance with the application preparation instructions contained in Section III of this solicitation

ALL APPLICATIONS MUST HAVE AN IIPS TRANSMISSION TIME STAMP OF NOT LATER THAN 11:59 PM EASTERN TIME ON 23 JAN 2003.

The only acceptable mode of application transmission is through IIPS. Applications submitted through the U.S. Postal Service, facsimile, telegraphically, courier companies, or hand-delivered hard copies will be considered non-responsive.

Applicants are advised to begin transmission 24 hours in advance of the deadline in order to prevent any transmission difficulties.

2.8 PROGRAM AREAS OF INTEREST (FEB 2001)

This solicitation contains multiple program areas of interest identified in the solicitation objectives. Applicants are cautioned that this solicitation is a master solicitation and that each program area of interest has it's own program-specific solicitation number for submission of applications. For example, Program Area of Interest 1, "Advanced Environmental Control Technologies for Coal" has a solicitation number of DE-PS26-03NT41714- 01. Applications will not be considered if they are submitted under the master solicitation.

Applicants should submit their application under the program area which best fits the majority of the effort to be performed. If an application is submitted under a program area of interest in which the DOE believes fits more appropriately in another program area of interest, the applicant will be directed to resubmit under the appropriate area of interest. Do not submit an identical application under more than one area of interest.

There is no limitation on the number of different applications an applicant may submit. However, a separate application must be submitted for each Program Area of Interest for which the applicant is interested in receiving an award. Each application must be complete and shall not rely upon another application for submission of the required documents.

2.9 LATE APPLICATIONS, AMENDMENTS AND WITHDRAWALS OF APPLICATIONS -- IIPS (JAN 2001)

An application or amendment of an application shall be timely if it is transmitted through IIPS and the date/time of the transmission indicated by IIPS is on or before the closing date(s) indicated above.

Applications or amendments of applications may be withdrawn by written notice by an authorized representative to the Contract Specialist via E-mail or by contacting the IIPS HELP Desk. A second application or amendment may then be submitted. The second or subsequent application must be submitted before the closing date to be considered.

In the event that two or more applications are received for the same project with the same file name, the application with the latest transmission time stamp will be considered for review. Therefore, it is important that you not merely make page changes and resubmit portions of the application that are amended. A complete amended application must be sent. Contact the IIPS HELP Desk for assistance.

2.10 ANTICIPATED SELECTION AND AWARD DATES (AUG 1999)

It is anticipated that selections for award will be made in April 2003. Awards are expected to be made within 60 calendar days following the selection.

2.11 CONTENT OF RESULTING AWARD (NOV 2000)

Any agreement awarded as a result of this solicitation will contain the applicable terms and conditions found in the Model Financial Assistance Agreement located at the NETL web site located at:

http://www.netl.doe.gov/business/faapiaf/MODEL.PDF

Blank areas appearing in the model agreement indicated by "[ ]" will be completed after negotiations.

2.12 APPLICATION PREPARATION COSTS (DEC 1999)

This solicitation does not obligate the Government to pay any costs incurred in the preparation and submission of applications, or in making necessary studies or designs for the preparation thereof or to acquire, or contract for any services.

2.13 COMMITMENT OF PUBLIC FUNDS (AUG 1999)

The Contracting Officer is the only individual who can legally commit the Government to the expenditure of public funds in connection with the proposed award. Any other commitment, either explicit or implied, is invalid.

2.14 FALSE STATEMENTS (AUG 1999)

Applications must set forth full, accurate, and complete information as required by this solicitation. The penalty for making false statements in applications is prescribed in 18 U.S.C. 1001.

2.15 QUESTIONS/AMENDMENTS TO SOLICITATION -- IIPS (NOV 2001)

All requests for explanation or interpretation of any part of the solicitation must be submitted through the "Submit Question" feature in IIPS.

The Government reserves the right not to respond to questions submitted after this date. Once a question is submitted, it cannot be edited. Questions submitted as well as the government's response to these questions may be viewed by using the "View Questions" feature in IIPS. The Government reserves the right not to respond to questions submitted by telephone, E-mail or in person at any time. The only method by which any term of this solicitation may be amended is by an express, formal amendment generated by the issuing office and disseminated through IIPS. No other communication whether written or oral will amend or supersede the terms of this solicitation.

Applicants are encouraged to periodically check IIPS to ascertain the status of any amendments and review the answers to questions as hard copies will not be distributed. Applicants are encouraged to click on the "Join Solicitation Mailing List" link if they would like to receive e-mail notifications on updates and/or modifications to the specified solicitation.

2.16 CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER (CFDA) (DEC 2000)

The Catalog of Federal Domestic Assistance Number is 81.089. The Applicant should put this CFDA number in Block 10 of the Standard Form 424, Application for Federal Assistance.

2.17 PARTICIPATION BY FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS (FFRDC) AND DOE MANAGEMENT AND OPERATIONS (M&O) CONTRACTORS

Applications submitted by, or substantially relying upon the technical expertise of, FFRDCs and DOE M&O contractors are not desired, will not be evaluated, and will not be eligible for an award under this solicitation. However, an application that includes performance by an FFRDC or DOE M&O contractor(s) as a subcontractor will be evaluated and may be considered for award, provided that: (1) the proposed use of any such entities is specifically authorized by the cognizant agency for the FFRDC or DOE for DOE M&O contractors, in accordance with the procedures established for the FFRDC or the M&O contractor; (2) the work is not otherwise available from the private sector; and (3) the estimated cost of the FFRDC or M&O contractor work does not exceed 25 percent of the total estimated project cost. DOE reserves the right to fund the work through a DOE field work proposal or an interagency agreement.

Application Submission Requirements

In addition to the application information to be provided by the applicant, the following requirements apply:

1. Justification.

The offeror shall submit a letter with its application (Volume I) which states that to the best of its knowledge, the work requested will not place the FFRDC or the DOE M&O contractor in direct competition with the domestic private sector, and that the proposed scope of work cannot be performed by any private entity.

2. Work Scope.
The offeror shall submit a detailed scope of work which clearly identifies that portion of the proposed effort for which the expertise and ability to perform lie solely with the DOE M&O contractor. This detailed scope of work shall be provided as an appendix to the Volume I, Technical Application.

3. Cost Information.

The offeror shall provide cost information for that portion of the proposed work scope (see 2, above) to be performed by the DOE M&O contractor. The cost information shall be furnished in the same format and level of detail as prescribed for subcontractors. The estimated cost of the effort shall be clearly identified in the Volume II, Business and Financial Application.

2.18 DETERMINATION OF RESPONSIBILITY (JAN 2001)

DOE will evaluate the potential Recipient's responsibility before award. Responsibility determinations are focused on the Recipient's capability to manage and account for the funds, property and other assets provided and to perform satisfactorily under the terms of the award. If a potential Recipient is determined to not be in compliance or cannot or will not comply with generally applicable requirements (see 10 CFR Part 600, Appendix A), the contracting officer will find the Recipient not responsible and may either disapprove the application or use special restrictive conditions as a term of award.

2.19 APPLICATION CLARIFICATION (JULY 1999)

DOE reserves the right to require applications to be clarified or supplemented to the extent considered necessary either through additional written submissions or oral presentations.

2.20 APPLICATION ACCEPTANCE PERIOD (AUG 1999)

The minimum application acceptance period shall be 180 calendar days after the deadline(s) for receipt of applications.

2.21 AWARD WITHOUT DISCUSSIONS (AUG 2000)

Notice is given that award may be made after few or no exchanges, discussions or negotiations. Therefore, all applicants are advised to submit their most favorable application to the Government. The Government reserves the right, without qualification, to reject any or all applications received in response to this solicitation and to select any application, in whole or in part, as a basis for negotiation and or award.

2.22 PRESUBMISSION REVIEW AND CLEARANCES (AUG 1999)

Pre-submission review under Executive Order 12372, "Intergovernmental Review of Federal Programs" is not required.

2.23 LOANS NOT AVAILABLE (JULY 1999)

Loans are not available under the DOE Minority Economic Impact (MEI) loan program, 10 CFR Part 800, to finance the cost of preparing a financial assistance application.

2.24 52.227-6 ROYALTY INFORMATION. (APR 1984)

(a) *Cost or charges for royalties*. When the response to this solicitation contains costs or charges for royalties totaling more than $250, the following information shall be included in the response relating to each separate item of royalty or license fee:

(1) Name and address of licensor.

(2) Date of license agreement.

(3) Patent numbers, patent application serial numbers, or other basis on which the royalty is payable.

(4) Brief description, including any part or model numbers of each contract item or component on which the royalty is payable.

(5) Percentage or dollar rate of royalty per unit.

(6) Unit price of contract item.

(7) Number of units.

(8) Total dollar amount of royalties.

(b) *Copies of current licenses*. In addition, if specifically requested by the Contracting Officer before execution of the contract, the offeror shall furnish a copy of the current license agreement and an identification of applicable claims of specific patents.

2.25 INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM (MAR 2001)

(a) PATENT RIGHTS
The government will have certain rights in all subject inventions. A subject invention is one which is conceived or first actually reduced to practice under a DOE award. This may include inventions that have been patented prior to the award of the contract, if the invention is first actually reduced to practice under the contract. The statutes defining the government's rights are found at 35 U.S.C. 200 to 212, http://www4.law.cornell.edu/uscode/ and the regulations are found at 10 CFR 927.3 http://www.access.gpo.gov/nara/cfr/index.html. The following is a general discussion, which is not exhaustive and so should not be relied on as legal advice. Review the statutes and regulations referenced above, and the clauses referenced below for a more complete explanation.

If the contractor or subcontractor is a domestic small business firm or non-profit organization, the clause at 48 CFR 952.227-11 applies. Under this clause, the contractor will have the first option to elect to retain title to any subject invention. However, the government retains certain rights such as march-in rights, U.S. preference, and government-use license.

If the contractor or subcontractor does not qualify as a domestic small business firm or non-profit organization, the clause at 48 CFR 952.227-13 applies. Under this clause, the government takes title to any subject invention and the contractor gets a revocable, nonexclusive, royalty free license. However, the contractor can petition the Department of Energy (DOE) for a waiver of patent rights. A minimum of 20% cost sharing is usually required for an advance patent waiver, and the DOE retains some rights in the invention such as march-in rights, US competitiveness, and government use license. The DOE waiver regulations are found at 10 CFR 784.

(b)RIGHTS TO TECHNICAL DATA
Pursuant to 48CFR 52.227-14 and 52.227-16, the Government has unlimited rights in technical data created under the agreement. Delivery or licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement or as may be negotiated as a condition of a patent waiver to insure continued development toward commercialization of an invention arising under a DOE agreement.

In this program, it is anticipated that DOE will be able to withhold certain technical data created under the program for up to five (5) years from the time it is created under The Energy Policy Act of 1992 (42 U.S.C 13541(d)). See the Act for a definition of the type of data that may be protected from public disclosure. The decision to include this provision in individual awards will be made on a case-by-case basis for each agreement considering the technology involved, etc. After the five-(5) year time period expires, such data is subject to release if it is a Government record.

2.26 NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES (AUG 1999)

Eligible activities under this program include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

2.27 ANNUAL HBCU/OMI TECHNOLOGY TRANSFER SYMPOSIUM/TRAVEL

Principal Investigators will be required to attend an annual, three (3) day, HBCU/OMI Technology Transfer Symposium at locations yet to be determined. For costing purposes only, applicants should use the following hypothetical meeting locations:
_ 2003 - Pittsburgh, PA
_ 2004 - Albuquerque, NM
_ 2004 - Atlanta, GA
Additionally, award funds may be used for domestic travel to one (1) technical meeting per year, each year of the respective grant. NOTE: Award funds may not be used for foreign travel. Included in each budget with regard to travel must be detailed information on travel type (i.e. surface, air), hotel/motel accommodations, and per diem.

2.28 FEDERAL COST PRINCIPLES/COST-SHARING/IN-KIND CONTRIBUTIONS (10

CFR 600.123 and .127)

The Federal Cost Principles applicable to specific types of grantees, subrecipients, and contractors under grants and subawards are as follows: (a) Institutions of Higher Education Office of Management and Budget (OMB) Circular A-21, "Cost Principles Applicable to Grants, Contracts and Other Agreements with Institutions of Higher Education," is applicable to both public and private colleges and universities.(b) State and Local Governments and Indian Tribal GovernmentsOMB Circular A-87, "Cost Principles Applicable to Grants, Contracts and Other Agreements with State and Local Governments," is applicable to State, Local and Indian tribal governments and shall also be used to the extent appropriate for foreign governments.(c) Nonprofit Organizations and Individuals OMB Circular A-122 "Cost Principles Applicable to Grants, Contracts and other Agreements with Nonprofit Organizations", applies to nonprofit organizations other than a non-profit institution of higher education or hospital. However, a few nonprofit organizations, as specifically listed in OMB Circular A-122, are subject to the commercial cost principles specified in subparagraph (d), below. OMB Circular A-122 shall also apply to grants to individuals. (d) Commercial Firms and Certain Nonprofit Organizations Title 48 CFR Subpart 31.2 (Federal Acquisition Regulations) "Contracts with Commercial Organizations," as supplemented by 45 CFR Subpart 931.2 (DOE Acquisition Regulations), applies to for-profit organizations (other than for-profit hospitals), including corporations, partnerships andsole proprietorships. Copies of OMB publications listed in subparagraphs (a)-(d) above may be obtained from the Office of Management and Budget, Office of Administration, Publications Unit, Washington, DC 20503.

Cost Sharing (10 CFR 600.123) is a generic term denoting any situation where the Government does not fully reimburse the applicant for all allowable costs necessary to accomplish the project or effort. Cost-sharing may be in various forms or combinations, which includes but is not limited to cash outlays, real property (or interest therein) needed for the project, personal property (equipment) or services, cost matching, or other in-kind sharing. Cost sharing may be accomplished by a contribution of either direct or indirect costs provided
such costs are otherwise allowable in accordance with the applicable cost principles.

Foregone fee/profit is excluded from consideration as cost-sharing.
Allowable costs which are absorbed by the applicant as part of its cost share may not be charged directly or indirectly to the Federal Government under other contracts, agreements or grants. The applicant's cost sharing may be provided by the applicant, or other companies/associations with which it has contracts, subgrants or other binding arrangements to perform the project. Cost sharing may include the value of contributions of other non-Federal sources, provided the contributions were not previously obtained free of charge from Federal
sources.
In-Kind Contributions represent noncash contributions which are directly beneficial, specifically identifiable and necessary to the performance of the project. In-kind contributions must be verifiable from the applicant's or third party's books and records. The value of any noncash contribution shall be established by the DOE after consultation with the applicant and/or third party donor; however, adequate supporting documentation must be provided in the application for the estimated value of any noncash contribution (applicant or third party).

SECTION III -APPLICATION PREPARATION INSTRUCTIONS

3.1 IIPS APPLICATION PREPARATION INSTRUCTIONS - GENERAL (NOV 2001)

The application shall be prepared as set forth herein to provide a standard basis for evaluation and to insure that each application will be uniform as to format and sequence. Applications are expected to be prepared in accordance with this section.

The applicant is advised that the submission of an application in an electronic format is required utilizing the Industry Interactive Procurement System (IIPS) through the Internet at http://e-center.doe.gov. IIPS provides the medium for disseminating solicitations, receiving applications, and evaluating applications in a paperless environment. Individuals who have the authority to enter their company into a legally binding contract and intend to submit applications via the IIPS system must register and receive confirmation that they registered prior to being able to submit an application on the IIPS System. An IIPS "User Guide for Contractors" can be obtained by going to the IIPS Homepage at http://e-center.doe.gov and then clicking on the "Help" button. Questions regarding the operation of IIPS may be E-mailed to the IIPS Help Desk at IIPS_HelpDesk@e-center.doe.gov or call the Help Desk at (800) 683-0751.

During review of the complete application, DOE may request the submission of additional information if the information is essential to evaluate the application.

3.2 OVERALL ARRANGEMENT OF APPLICATION (NOV 2001)

The overall application shall consist of one (1) volume, entitled 'Volume II -- Technical Application.'

In addition, SF 424, Application for Federal Assistance, shall be submitted. This form is found at http://www.netl.doe.gov/business/faapiaf/main.html, and should be submitted with the Technical Volume.

All of the above shall be submitted through IIPS at http://e-center.doe.gov.

If an applicant is selected for an award under this solicitation, the following two (2) volumes will be requested:

APPLICATION VOLUME -- TITLE PAGE LIMITATION

Volume I -- Offer and Other Documents NONE

Volume III -- Cost Application NONE

All forms and instructions needed for preparation of each volume are found on the NETL homepage at:

http://www.netl.doe.gov/business/faapiaf/main.html

Instructions for completion of the forms are contained on the back of each form. Questions on completion of the forms should be addressed to the Contract Specialist.

3.3 FILE FORMAT (NOV 2001)

To aid in evaluation, applications shall be clearly and concisely written as well as being neat, indexed (cross-indexed as appropriate), and logically assembled. All pages of each part shall be appropriately numbered, and identified with the name of the applicant, the date, and the solicitation number to the extent practicable.

Application files are to be formatted in one of the following software applications:

Adobe Acrobat PDF, Word, WordPerfect, Excel

Files shall be saved with filenames that clearly identify the file being submitted. Filename extensions shall clearly indicate the software application used for preparation of the documents, i.e. . .pdf , .doc , .wpd, xls.

In order to create PDF documents, complete the fillable PDF forms, save them, and/or electronically transmit them to DOE. The full version of Adobe Acrobat must be acquired. Information regarding Adobe Acrobat software can be obtained from Adobe Systems, Inc. at http://adobe.com.]

3.4 SIGNED ORIGINALS (NOT REQUIRED)

Submission of electronic proposals via IIPS will constitute submission of signed copies of the required documents. The name of the applicant's authorized official shall be entered (typed or electronic signature) in the appropriate space shown on the form(s).

3.5 VOLUME II-- TECHNICAL APPLICATION PREPARATION INSTRUCTIONS - IIPS (NOV 2001)

When the Applicant begins to "Create Proposal" the Applicant will create an IIPS cover page and attach the required files to the link identified as: Attach Volume 2/ Technical Proposal. For consistency, the applicant is instructed to use the file names specified below,. Filename extensions shall clearly indicate the software application used for preparation of the documents , i.e, ".wpd" for WordPerfect, ".pdf" for Adobe Acrobat, or ".doc" for Word files, "xls" for Excel files:

The Technical Application must be submitted to IIPS in the following three (3) files:

File No.	Title	File Name

File 1.	Public Abstract	ABSTRACT.---
File 2.	Technical Documentation	TECH.---
File 3.	Resumes of Key /Critical Personnel, Publications, Qualifications and Experience of Participating Organization, and/or Letters of Industry Support, if applicable.	ATTACHMENTS.---
File 4.	Statement of Project Objectives	OBJECTIVES.---
File 5.	Certificate of Eligibility	CERT.---
File 6.	SF 424, Application for Federal Assistance	SF424.---

FILE DESCRIPTION

FILE 1 PUBLIC ABSTRACT

This file shall contain a public abstract of not more than one (1) single spaced typewritten page clearly stating the objectives of the proposed research, the title of the project, methodology, and sponsoring organization(s). It is a stand alone document. The Applicant shall provide a point of contact for coordination, preparation and distribution of press releases in this abstract. This abstract may be released to the public by DOE in whole or in part at any time. It must not contain proprietary data or company sensitive business information.

FILE 2 TECHNICAL DOCUMENTATION

This file shall include a cover page indicating the solicitation number, name and address of the Applicant, point of contact, telephone/FAX number/E-Mail address, title of project, and date of application. The technical documentation shall not exceed 15 (fifteen) pages (Not including the cover sheet.) It shall be double-spaced, using 10 or 12-point font, 1" margins, and when printed, will fit on size 8 1/2" by 11" paper. Pages in excess of the page limitations will be removed.

The technical application will consist of the Applicant's outline addressing the technical and management aspects of the assistance action, the Applicant's capabilities and what the Applicant will do to satisfy the requirements of the solicitation. Since the technical information contained in this section will be evaluated to determine such matters as understanding of the work to be performed, technical approach, and potential for completing the desired work, it should be specific and complete in every detail. The Application should be practical and be prepared simply and economically, providing a straightforward concise delineation of what it is the Applicant will do to satisfy the requirements of the solicitation.

To help facilitate the review process and to insure addressing all the review criteria, the applicant shall use the following format when preparing the technical discussion. This format relates to the technical evaluation criteria found in Section IV.

The technical proposal shall include the following:

1. Technical Merit and Approach

In this section, the applicant must demonstrate that:

- The research represents a significant contribution to expanding the base of knowledge in the defined focus area. .
- The proposed approach is innovative and represents a significant departure from state-of-the-art approaches to the described problem.
- An awareness of the state-of-the-art in related areas of focus area research is demonstrated.
- A well defined, logical statement of work is provided to effectively address the technical issues.
- An approach is described that is scientifically sound and well planned and current methods (or methods adequate to solve the problem) are used in the investigation.

2. Stated Objectives and the Probability of Achieving Those Objectives.

In this section, the applicant must demonstrate that:

- The application clearly addresses a problem, concept or question described within the focus area.
- The Application addresses the probability of achieving the objectives.
- The Applicant understands the technical risks of the project, and the methods to overcome those risks.
- The Applicant understands potential barriers to achieving the objectives.

3. Qualifications of Personnel

In this section, the applicant must demonstrate:

- The qualifications of the Principal Investigator(s) or key personnel considered critical to the success of the proposed project.

4. Facilities/Equipment

In this section, the applicant must demonstrate that:

- The facilities or specialized equipment/techniques are available to the applicants to meet the project objectives.

FILE 3 RESUMES OF KEY /CRITICAL PERSONNEL, PUBLICATIONS, QUALIFICATIONS AND EXPERIENCE OF PARTICIPATING ORGANIZATION, AND/OR LETTERS OF INDUSTRY SUPPORT, IF APPLICABLE.

This file shall contain resumes of key personnel, qualifications and experience of participating organizations, additional pertinent publications, letters of commitment, etc.

FILE 4 STATEMENT OF PROJECT OBJECTIVES

The Department of Energy's, National Energy Technology Laboratory uses a specific format for the Statement of Project Objectives in its awards. In solicitations such as this one, where the Government does not provide the Statement of Project Objectives, the Applicant is required to provide one, which the DOE will then use to generate the Statement of Project Objectives to be included in the award. Several specific tasks have also been provided in the following format for the Applicant to insert into the Statement of Project Objectives at the appropriate location.

All applications must contain a single, detailed Statement of Project Objectives that addresses how the project objectives will be met. The Statement of Project Objectives must contain a clear, concise description of all activities to be completed during project performance and follow the structure discussed below. The Statement of Project Objectives may be released to the public by DOE in whole or in part at any time. It shall not contain proprietary or confidential business information.

The Statement of Project Objectives is generally less than 10 pages in total for the proposed work. Applicants shall prepare the Statement of Project Objectives in the following format:

TITLE OF WORK TO BE PERFORMED

(Insert the title of work to be performed. Be concise and descriptive.)

A. OBJECTIVES

Include one paragraph on the overall objective(s) of the work. Also, include objective(s) for each phase of the work.

B. SCOPE OF WORK

This section should not exceed one-half page and should summarize the effort and approach to achieve the objective(s) of the work for each Phase.

C. TASKS TO BE PERFORMED

Tasks, concisely written, should be provided in a logical sequence and should be divided into the phases of the project. This section provides a brief summary of the planned approach to this project.

PHASE I

Task 1.0 - (Title)

(Description)

Subtask 1.1 (Optional)

(Description)

Task 2.0 - (Title)

PHASE II (Optional)

Task 3.0 - (Title)

D. DELIVERABLES

The periodic, topical, and final reports shall be submitted in accordance with the "Federal Assistance Reporting Checklist," which can be found in IIPS on this solicitation's opening page under Link 3, Model Financial Assistance Agreement, Attachment 2 of that document, and the instructions accompanying the checklist.

The Applicant shall provide a list of deliverables other than those identified on the "Federal Assistance Reporting Checklist" that will be delivered. These reports shall also be identified within the text of the Statement of Project Objectives.

1. Task 1.1 - (Report Description)
2. Task 2.2 - (Report Description)

E. BRIEFINGS/TECHNICAL PRESENTATIONS (If applicable)

The Applicant shall prepare detailed briefings for presentation to the Contracting Officer's Representative (COR) at the COR's facility, location to be determined at a later date. Briefings shall be given by the Applicant to explain the plans, progress, and results of the technical effort. At a minimum,

the Applicant shall include a project kickoff briefing and a final project review briefing. For costing purposes, the Applicant shall consider these briefings to be held at NETL in either Pittsburgh, PA or Morgantown, WV.

The Applicant shall provide and present a technical paper(s) at the DOE/NETL Annual Contractor's Review Meeting to be held at a place to be determined

In order that the Technical application may be evaluated strictly on the merit of the material submitted, no cost information is to be included in the Technical Application.

FILE 5 CERTIFICATION OF ELIGIBILITY

The Applicant must provide this certification as an assurance that they will comply with the eligibility restrictions of this solicitation.

This certification is Attachment A (Filename: CERT.---) to this solicitation.

FILE 6 SF 424, APPLICATION FOR FEDERAL ASSISTANCE

The Applicant must provide an SF 424, Application for Federal Assistance. This form is found at http://www.netl.doe.gov/business/faapiaf/main.html, and should be submitted with the Technical Volume.

3.6 UNNECESSARILY ELABORATE APPLICATIONS (SEPT 2000)

Unnecessarily elaborate applications beyond those sufficient to present a complete and effective response to this solicitation are not desired. Elaborate art work and expensive visual presentations are neither necessary nor wanted.

SECTION IV - EVALUATION AND SELECTION

4.1 INTRODUCTION (MAY 2000)

This section contains the evaluation approach as well as the individual criteria to be used in the evaluation of applications.

4.2 GENERAL (JULY 1999)

It is the policy of DOE that any financial assistance be awarded through a merit-based selection process which means a thorough, consistent and independent examination of applications based on pre-established criteria by persons knowledgeable in the field of the proposed project.

4.3 PRELIMINARY REVIEW (FEB 2001)

Prior to a comprehensive evaluation, applications will undergo an initial review to determine whether the information required by the solicitation has been submitted and is properly completed. Applications will be reviewed for relevance to the "Support of Advanced Fossil Resource Utilization Research by Historically Black Colleges and Universities and Other Minority Institutions" program and for responsiveness to the requirements of the solicitation. Failure to successfully meet any one of these preliminary review criteria may result in the elimination of the application and no further consideration in the Comprehensive Evaluation. In the event that an application is eliminated, a notice will be sent to the Applicant stating the reason(s) that the application will not be considered for financial assistance under this solicitation.

4.4 COMPREHENSIVE EVALUATION (AUG 1999)

Applications passing the preliminary evaluation shall be subject to a comprehensive evaluation in accordance with the technical evaluation criteria listed in this section.

The technical evaluation is conducted to determine the merits of the technical application with regard to the potential success of the project as well as future commercial applications. Comprehensive evaluation results in a numerical score for each application against each of the technical evaluation criteria.

The cost evaluation, which is not point scored, is conducted to determine the completeness of the cost estimate, appropriateness and reasonableness of the cost, and to assess the applicant's understanding of the Statement of Project Objectives.

4.5 PROGRAM POLICY FACTORS

Program Policy Factors are those which, while not indicative of the application's technical merit, may be essential to the process of selection of the application(s) that individually or collectively represent a range of projects that would best serve DOE program objectives. In the HBCU/OMI Research and Development Program, DOE seeks to encourage broad participation from within the diverse HBCU/OMI community and private sector fossil energy community. In addition, DOE seeks a balanced program in fossil resource utilization research and development in furtherance of the nation's energy objectives. Accordingly, in determining which of the applications shall receive DOE funding support, the following Program Policy Factors will be considered by the Source Selection Official (SSO):

a. Geographical Regional Balance
b. Broad University Participation
c. Fossil Fuel Category (i.e., Coal, Oil, and Gas) Balance
d. Programmatic Balance

The Source Selection Official will select a mix of applications for award from the findings established by the Evaluation Panel. The Source Selection Official will consider the relative technical ranking as well as applicable program policy factors in determining which application(s) will best satisfy program

objectives.

4.6 TECHNICAL EVALUATION CRITERIA (AUG 1999)

Technical applications submitted in response to this solicitation will be evaluated and scored in accordance with the criteria listed below:

Technical Merit and Approach (45%)
Stated Objectives and the Probability of Achieving Those Objectives (40%)
Qualifications of Personnel (10%)
Facilities/Equipment (5%)

Technical Applications submitted in response to this Program Solicitation will be evaluated and point-scored in accordance with criterion (1) through (4) below (For Technical Topics 1-7). The relative importance of each criterion is indicated by the maximum point score (as noted in parentheses) allocated to each criterion. The necessary information to be submitted to satisfy the evaluation requirements for each criterion is specified below for each criterion.

Criterion 1: Technical Merit and Approach (45 points.) The research represents a significant contribution to expanding the base of knowledge in the defined focus area. The proposed approach is innovative and represents a significant departure from state-of-the-art approaches to the described problem. An awareness of the state-of-the-art in related areas of focus area research is demonstrated. A well defined, logical statement of work is provided to effectively address the technical issues. An approach is described that is scientifically sound and well planned and current methods (or methods adequate to solve the problem) are used in the investigation.

Criterion 2: Stated Objectives and the Probability of Achieving Those Objectives (40 points). The application clearly addresses a problem, concept or question described within the focus area. The Application addresses the probability of achieving the objectives.

Criterion 3: Qualifications of Personnel (10 points). The qualifications of the Principal Investigator(s) or key personnel considered critical to the success of the proposed project.

Criterion 4: Facilities/Equipment (5 points). The facilities or specialized equipment/techniques available to the applicants to meet the project objectives.

For Task 8 only the following criteria will apply:

Technical Merit and Approach (55%)
Stated Objectives and the Probability of Achieving Those Objectives (45%)

Criterion 1: Technical Merit and Approach (55 points.) The research represents a significant contribution to expanding the base of knowledge in the defined focus area. The proposed approach is

innovative and represents a significant departure from state-of-the-art approaches to the described problem. An awareness of the state-of-the-art in related areas of focus area research is demonstrated. A well defined, logical statement of work is provided to effectively address the technical issues. An approach is described that is scientifically sound and well planned and current methods (or methods adequate to solve the problem) are used in the investigation.

Criterion 2: Stated Objectives and the Probability of Achieving Those Objectives (45 points) The application clearly addresses a problem, concept or question described within the focus area. The Application addresses the probability of achieving the objectives.

4.7 COST EVALUATION CRITERIA (JULY 1999)

The costs proposed will be evaluated in response to this solicitation in order to:

(a) Determine the level of verifiable cost sharing;

(b) Ensure that all work elements included in the Statement of Project Objectives have associated costs, and that those costs appear appropriate and reasonable for the effort proposed; and

(c) Assess the applicant's understanding of the Statement of Project Objectives.

4.8 RELATIVE ORDER OF IMPORTANCE OF EVALUATION CRITERIA (NOV 2000)

The evaluation of the technical application will be conducted using pre-established weights to determine the relative merits of the application in accordance with the technical evaluation criteria. The technical evaluation (Volume II - Technical Application) represents 100% of the total evaluation scoring.

The following weighting factors will be applied to each technical evaluation criteria to obtain a final evaluation rating for each application.

Topics 1-7

Technical Merit and Approach (45%)
Stated Objectives and the Probability of Achieving Those Objectives (40%)
Qualification of Personnel (10%)
Facilities/Equipment (5%)

Topic 8

Technical Merit and Approach (55%)
Stated Objectives and the Probability of Achieving Those Objectives (45%)

4.9 BASIS FOR SELECTION AND AWARD (MAY 2000)

The Department of Energy anticipates the award of one or more financial assistance instruments to those applicants whose applications are determined to be in the best interest of the Department in achieving the program objectives set forth in this solicitation. Selection of an application by the Department will be achieved through a process of evaluating and comparing the relative merits of the applicant's complete applications, in accordance with all of the evaluation factors set forth in this section.

This process reflects the Department's desire to accept an application based on its potential in best achieving program objectives, rather than solely on evaluated technical merit or cost. Accordingly, the Department of Energy may select for an award all, none, or any number or part, of an application, based on its decision as to which meritorious applications best achieve the program objectives set forth in this solicitation.

It is important for applicants to note that selection for negotiations will be made entirely on the basis of applications submitted. Applications should, therefore, address specifically the factors mentioned in the evaluation criteria, and not depend upon reviewers' background knowledge.